REMARKS

Claims 1-20 are pending in the present applications, and have been examined. In the present advisory action, the examiner maintains his rejection of claims 1-20. Applicants address the present actions as follows.

Claims 1-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bhat et al. (U.S. Patent No. 5,207,864) in view of Cohn et al. (U.S. Patent No. 7,276,789). Applicants traverse this rejection.

The examiner asserts, in the most recent Advisory Action, that the bonding features and target features recited in Cohn correspond to the bonding surfaces recited in independent claims 1 and 19. Claims 1 and 19 have been amended to clarify that the bonding surfaces are comprised of the entire surfaces of the semiconductor wafers, and so they recite bringing the entire surfaces of the semiconductor wafers into direct contact with each other.

Bhat is directed to a method of fusing semiconductor wafers to one another (See Bhat col. 4, lns. 57-64). The reference teaches heating semiconductor wafers while applying pressure uniaxially using a weight to bond the semiconductor wafers. The thermocompressive process causes uniform fusion throughout the wafer hetero-interface, with the exception of small dislocations caused by lattice mismatch (col. 4, lns. 15-20). Thus, Bhat teaches that heat and uniaxial pressure should be used to directly bond semiconductor wafers through chemical fusion, forming covalent bonds between the wafers (see col. 4, lns. 57-64; col. 6, lns. 12-16).

In contrast, Cohn teaches that two substrates can be joined using metallic bonding features and target features that are deposited onto small areas of the substrate (Cohn col. 7, lns. 42-48; col. 8, lns. 11-15). Bonding features are generally positioned to contact corresponding target features (col. 8, lns. 6-11). Then, heat and pressure are applied so that the bonding and target features deform, holding the substrates in proximity to one another, but maintaining a gap between the two substrates (col. 8, lns. 34-40). Accordingly, Cohn fails to disclose or suggest providing bonding surfaces that include the entire surface of semiconductor wafers, since the bonding features and target features disclosed by Cohn are not semiconductor wafers, and do not include an entire surface of the substrates. In fact, Cohn teaches that an advantage of the disclosed technique is that the contact area between the two substrates is very small (Col. 8, lns. 49-50).

Additionally, the process of Cohn fails to bring the bonding surfaces (i.e., the entire surfaces of the semiconductor substrates) into direct contact. Instead, Cohn teaches that bonding features and target features are interposed between the substrates, preventing direct contact between the substrates. Further, the bonding process disclosed by Cohn merely compresses the bonding features by about 50% (Cohn, col. 8, lns. 37-40). Since the bonding features have an initial height of at least 3 microns, the process described in Cohn leaves a gap of 1.5 or more microns between the semiconductor substrates (col. 7, lns.53-56).

For these reasons, one of ordinary skill would not have been motivated to combine the bonding process described in Cohn with the wafer fusion process described

in Bhat. That is, while Bhat discloses a process for fusing semiconductor wafers, Cohn merely discloses a method of attaching two substrates to one another via small metallic bonding features. Further, while the wafers of Bhat are in direct contact with one another, Cohn teaches that substrates are separated from one another by a relatively substantial gap. Thus, applicants request withdrawal of the rejection of claim 1 and its dependent claims.

Moreover, Cohn merely teaches that the hot isostatic pressing is sufficient to plastically deform the metallic bonding features and target features. That is, there is no indication in either Cohn or Bhat that the hot isostatic pressing would also be sufficient to create a bond between two semiconductor wafer surfaces, as recited in the present claims. To the contrary, the present specification discloses that hot isostatic pressing was previously uninvestigated because the relatively low level of temperatures and pressure applied during a reasonable time do not make it apparent that bonding will be successful (See applicants' specification p. 9, lns. 28-31). Accordingly, applicants assert that there is no teaching, suggestion, motivation or other reason provided to combine the references. For this additional reason, applicants again request withdrawal of the rejection of claims 1-20.

For all the foregoing reasons, applicants submit that this application is in condition for allowance, which is respectfully requested. The examiner is invited to contact the undersigned attorney is an interview would expedite prosecution.

Respectfully submitted,

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